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PROGRESS REPORT

# CHEMICAL CONTROL OF THE BLACK TURPENTINE BEETLE, DENDROCTONUS TEREBRANS (OLIV.), IN NAVAL STORES TIMBER

By

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This is a progress report on an exploratory study titled "Chemical control of the black turpentine beetle, Dendroctonus terebrans (Oliv.), in naval stores timber." It summarizes the results of tests 1 and 2 of a plan designed on June 6, 1962.

## OBJECTIVES

A 1.0 percent gamma isomer BHC solution in diesel oil, when thoroughly sprayed on infested bark, is known to destroy existing broods and prevent further attack for a period of several months. However, naval stores operators in Louisiana have reported that when this formulation is applied to faced longleaf pines or even to pines prior to chipping, gum production is reduced about 50 percent for a month or more. As a result, some operators have been reluctant to use this method of control.

Exploratory studies were carried out to determine the effect of the spray treatment on gum flow, and to discover whether BHC, diesel oil, or a combination of the two, is the cause of gum reduction. Also, in case diesel oil was determined to be the cause, turpentine was tested in an attempt to find a carrier for BHC that would not adversely affect the tree.

## METHODS

Two experiments, one following the other, were carried out in naval stores timber at the Alexander State Forest, Woodworth, Louisiana.

In the first experiment, five plots were selected, each consisting of 20 first-year chipped trees. The plots were on the same site, with test trees double-faced and of near equal diameter and crown development. Only trees with a good gum supply in the cups were chosen for the study. There was no evidence of black turpentine beetle activity in the area.

On June 21, immediately after the cups were emptied by the dipping and chipping crew, the basal portion of the trees, including the faced areas, in four plots were sprayed with a 1.0 percent BHC-diesel oil solution, a 1.0 percent BHC aqueous emulsion, diesel oil, and turpentine, respectively. Trees in the fifth plot were not treated and served as a check.

On July 12, one day before dipping, cups were weighed, and the total gum production in each plot was compared to that of the check plot.

In the second experiment, three additional plots of 20 trees each were established on the same site, but only the 1.0 percent BHC-oil solution and BHC aqueous emulsion sprays were tested. Spraying was done on July 25, one day after the cups were dipped. On August 8, 14, and 20, and September 4, one or two days before subsequent dippings (or 12, 20, 26, and 41 days after treatment), cups in the sprayed plots were weighed and totals compared to the check plot.

## Observations

Results of the first experiment are shown in table 1. The total gum production in the plot sprayed with BHC-oil solution was 15 percent less than in the check plot and substantially less than in the other treated plots. The 6.5 percent reduction in the diesel oil treated plot, however, suggests that oil alone also has an adverse affect on gum flow.

Two weeks after treatment, two trees sprayed with turpentine became infested with the black turpentine beetle, Three weeks later, two additional trees in the same plot had light attacks. Other faced trees, including untreated trees in the area, showed no evidence of attack throughout the summer.

Results of the second experiment are summarized in table 2. Again, gum reduction in the BHC-oil sprayed plot was apparent, with weight losses of 9.9, 7.7, 8.7, and 2.7 percent at the time of the respective weighings. Gum reduction in the plot sprayed with the BHC aqueous emulsion was negligible.

Table 1.--Influence of BHC and spray carriers on gum production. Plots sprayed, June 21; cups weighed, July 12, 1962

| Plot no. | Treatment | Total weight of cups and gum | Gum reduction |
|---|---|---|---|
| | | Pounds | Percent |
| 1 | 1% BHC-oil solution | 116 | 15.3 |
| 2 | #2 diesel oil | 128 | 6.5 |
| 3 | 1% BHC aqueous solution | 134 | 2.9 |
| 4 | Turpentine | 133 | 2.9 |
| 5 | Check | 137 | 0.0 |

Table 2.--Influence of 1 percent BHC-oil solution and aqueous emulsion on gum production. Plots sprayed, July 25; cups weighed at irregular intervals prior to dipping

| Plot | Treatment | 8/6/62 | | 8/14/62 | | 8/20/62 | | 9/4/62 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total wt. cups and gum Lbs. | Loss % | Total wt. cups and gum Lbs. | Loss % | Total wt. cups and gum Lbs. | Loss % | Total wt. cups and gum Lbs. | Loss % |
| 1 | BHC-oil solution | 100 | 9.9 | 107 | 7.7 | 104 | 8.7 | 106 | 2.7 |
| 2 | BHC-aqueous emulsion | 109 | 1.8 | 113 | 2.5 | 112 | 1.7 | 107 | 1.8 |
| 3 | Check | 111 | 0.0 | 116 | 0.0 | 114 | 0.0 | 109 | 0.0 |

## DISCUSSION

Results of the study suggest that the combination spray of BHC and diesel oil, and not the oil alone, is the primary cause of gum reduction, and that this reduction, at least in first-year chipped trees, is not as great as expected. It is possible that the penetrating oil carries the BHC into living tissues and that the BHC adversely affects gum flow. In this respect, consideration is given to Thatcher's research (1) on the toxicity of BHC to loblolly pine seedlings. In his study, BHC aqueous emulsions and suspensions were found to cause serious growth retardation.

## RECOMMENDATIONS

When manpower becomes available, it is recommended that the following studies be made.

1. An exploratory study to further test the adverse effects of a 1.0 percent BHC-oil solution and diesel oil alone on gum production in second-year faced trees. Uninfested trees and trees under attack by the black turpentine beetle should be treated and compared to respective check plots.
2. An exploratory study in logging areas where beetle populations are high to determine if a BHC-turpentine formulation applied to stumps will serve as an attractant. If attraction to the stumps is great enough, the beetles may be less likely to invade trees in the residual stand.

## COOPERATION

Newport Industries, Oakdale, Louisiana provided turpentine for the study, and kept the laboratory informed as to when chipping and dipping was to be done.

The Louisiana Forestry Commission provided the study area, and assisted in laying out the plots.

## REFERENCE

1. Thatcher, R. C. Toxicity of BHC to loblolly pine seedlings. Jour. Econ. Ent., 53(1): 175-176. February 1960.